and 93, or 43 per cent, I have found only at Linnton, though at least 31 of these have been reported by other collectors from different points in the west. Perhaps it would be safe to say that 50 species of the above list have been collected for the first time on the Pacific coast, or at least within the limits of the state of Oregon.

PLEISTOCENE PLANTS IN THE MARINE CLAYS OF MAINE

By Edward W. Berry

The marine clays and associated sands of late Pleistocene age so widely distributed in northern New England and the St. Lawrence Valley and which in a large measure suggested the Champlain stage of the Pleistocene adopted by Dana in the first edition of his Manual have been the occasion of a considerable literature from the days of Desor down to the present.

These deposits occur at varying heights above the present sea level up to an altitude of 690 feet according to the recent determinations of Johnston.* Most observers have assumed that these deposits, commonly differentiated into "Saxicava sands" above and "Leda clays" below, could be correlated with precision over this area, often on the basis of lithology alone. That this is not true and that each locality must be considered separately in its relation to topography, physical history, adjacent glacial deposits and fossil content should be obvious. Recently Katz and Keith† have described the Newington Moraine and mapped it from near Portland, Maine, to Newburyport, Mass. This moraine is correlated with the late Wisconsin and the authors cited present evidence to show that it was submarine in origin and contemporaneous with that part of the so-called Leda clay of that region lying seaward of the moraine while the clay lying inside the moraine is younger. On the other hand Little,‡ who has been making a study of the Waterville (Maine) region

* Johnston, W. A., Can. Geol. Surv. Mus. Bull. No. 24, p. 5, 1916.

† Katz, F. J., and Keith, Arthur, U. S. Geol. Survey Prof. Paper 108B, pp. 11–29, 1917.

‡ Little, H. P., Bull. Geol. Soc. Am. (in press).

concludes that a short period of subaërial erosion intervened before the deposition of the marine clay, on the Waterville esker. In the course of Professor Little's work a large marine fauna was collected from the clay at Waterville as well as occasional leaves of the vegetation then growing on the nearby shores, and it is the purpose of the present brief note to record the plants discovered in these clays and their evidence regarding the late Pleistocene history of the region.

The determinable species represented are the following:

Populus balsamifera Linné (two incomplete specimens).

Ilex verticillata (Linné) A. Gray (one well-preserved specimen shown in Fig. 3).

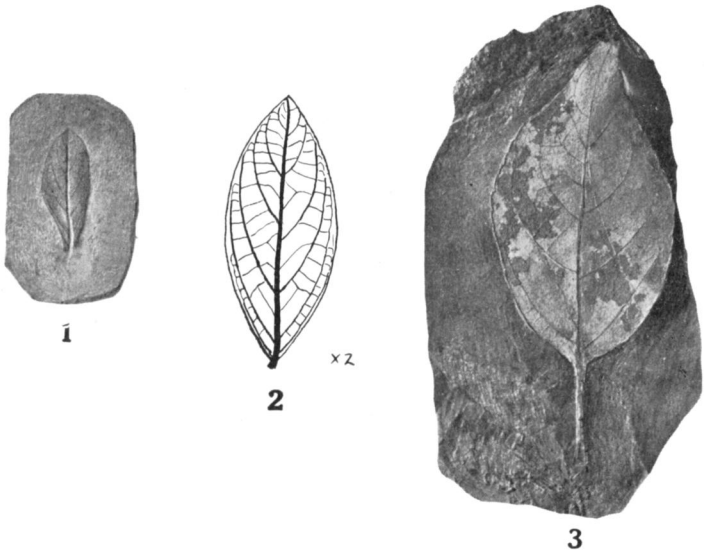

FIG. 1. (1), *Gaylussacia dumosa;* (2), *Vaccinium corymbosum;* (3), *Ilex verticillata,* all from marine clays of Maine.

Gaylussacia dumosa (Andr.) T. and G. (the specimen shown in Fig. 1).

Vaccinium corymbosum Linné (four specimens, one of which is shown twice natural size in Fig. 2).

Populus balsamifera is found in the existing flora from Labrador to Maine, New York and Michigan, northward to Hudson Bay and northwestward to British Columbia and Alaska. It is

common throughout the northern and central sections of Maine and extends southward to the coast in Hancock and Knox counties, and occurs along riverbanks in Kennebec and Androscoggin counties.* Fossil forms of this species have been recorded from both the interglacial (warm) and intermediate floras of the Don Valley, Ontario.

Ilex verticillata at the present time ranges from Nova Scotia to Florida and is common throughout the state of Maine. It has not heretofore been known in the fossil state.

Gaylussacia dumosa is found at the present time in sandy bogs from southern Newfoundland to northern Florida, southern Alabama and southeastern Mississippi. In Maine it is common in bogs near the coast, extending inland locally to Manchester in Piscataquis County and Orono in Penobscot County. It has not heretofore been known in the fossil state.

Vaccinium corymbosum is found at the present time in swamps, thickets and woods from Newfoundland to Virginia and westward locally to Minnesota. In Maine it is abundant throughout the state near the coast and extends inland to Oxford, Somerset, Piscataquis and Penobscot counties. It has been found fossil in the Talbot formation of Maryland, the Chowan formation of North Carolina and the late Pleistocene of Alabama.

The foregoing four species occur as stray individuals that were brought by stream action to the place of deposition of the marine clays, in which they are associated with abundant traces of the invertebrate fauna. In the case of the *Gaylussacia* and the *Populus* the single hand specimens contain several shells. This marine fauna as it is represented at Waterville contains 22 determined species of a decidedly cold water facies, at least one of the forms not being known south of Labrador at the present time and several others being distinctly arctic types. The plants on the other hand afford conclusive evidence that the terrestrial climate at the time they were living could not have been very different from the present climate of the coast region of Maine, judging from the fact that the *Gaylussacia* and the *Vaccinium*

* I am greatly indebted to Professor M. L. Fernald, of Harvard University, whose accurate and detailed knowledge of the distribution of New England plants has been graciously placed at my disposal.

both reach their northern limits in southern Newfoundland and the *Ilex* in Nova Scotia, and that all except the *Populus* extend at present far to the southward of the Maine region. It would seem therefore that a glacial front below sea level as in the case of the Newington moraine farther south would not have been favorable for the development of vegetation unless it is assumed that the climate had already become warmer and the glacier had become covered with vegetation as is the case with some of the present Alaska glaciers. This is a possible explanation but it involves genial conditions extending over a number of years, during which it would seem as if ice melting would be rapid and the predicated mantle of soil on the glacier would be disturbed, moreover the species found fossil are not the types that would be at all likely to grow in such situations. On the other hand, bearing in mind the sort of contacts between the marine clay and the glacial materials, as described by Professor Little and his interpretation of the history of the Waterville region, the explanation that accords precisely with the facts observed would demand the retreat of the ice from this region, the introduction of vegetation from the south and the continued but diminishing presence of valley ice the melting of which furnished the cold water that enabled the marine fauna to continue its existence in these estuaries. If this is the true interpretation of the succession of events then the marine deposits at Waterville would be somewhat younger than the late Wisconsin clays in front of the Newington moraine and would constitute the closing event in the Pleistocene history of the Waterville region, assuming that a division can be made between what is commonly called Pleistocene and Recent.

SHORTER NOTES

SCLEROTINIA AND BOTRYTIS.—Connection has recently been established between an apparently undescribed species of *Sclerotinia* occurring in woods in the upper end of Van Cortlandt Park on the rootstocks of wild geranium and a species of *Botrytis* occurring on the roots and rootstocks of the same host. The